Overview of EHR
STEM Education Programs

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NSF by the numbers

Other than the FY 2017 estimation, numbers shown are based on FY 2016 estimated activities.
$952 million FY 2017 budget request

97% funds research, education and related activities

4,250 proposals

845 awards funded

650 EHR-funded Institutions

145,100 EHR-supported individuals

All S&E disciplines funded

Funds research into STEM education

42 former GRF fellows received Nobel Prize

EHR is committed to an inclusive STEM enterprise for science and society
DUE’s Mission:

To promote excellence in undergraduate science, technology, engineering, and mathematics (STEM) education for all students.

Potentially Transformative Education R&D
Transformative Projects

- Transformative activity involves ideas, discoveries, or tools that **radically change our understanding** of an important existing scientific or engineering concept or educational practice or leads to the **creation of a new paradigm or field** of science, engineering, or education. Such research challenges current understanding or provides pathways to new frontiers.
- Transformative activity results often do not fit within established models or theories and may initially be unexpected or difficult to interpret; their transformative nature and utility **might not be recognized until years later**.

**Transformative Activity**

| Challenges conventional wisdom | Leads to unexpected insights that enable new techniques or methodologies | Redefines the boundaries of science, engineering, or education |
The Innovation Cycle of Educational Practice and Research

which help improve
Answers Insights
that results in
Educational Research

Educational Practice
identifies and motivates
Questions Ideas

which lead to

Adapted from Booth, Colomb, and Williams, 2008
Research v. Development

• STEM Education programs emphasize research/knowledge generation

• Development activities can be part of a project where activities are germane to answering specific research questions
Proposals should describe projects that **build on available evidence and theory**, and that will **generate evidence and build knowledge**

**Implement / adapt and study**
- Effective high quality curricular and co-curricular activities and professional development
- Activities tailored to students, STEM faculty, and different types of institutional contexts

**Know what has been done!**

**Use the literature!**

**Inform the community of the results!**
Useful Resource: Education Research

Common Guidelines for Education Research and Development

A Report from the Institute of Education Sciences, U.S. Department of Education and the National Science Foundation

August 2013
The submitter’s three jobs

1. Identify the right funding opportunity
2. Conceptualize a fantastic project
3. Write a persuasive proposal in 15 pages
Selected STEM Education Programs

- **DUE Programs**
  - Improving Undergraduate STEM Education (IUSE:EHR)
  - Advanced Technological Education (ATE)
  - Scholarships in Science, Technology, Engineering, and Mathematics Education (S-STEM)

- **EHR-Wide Programs**
  - Innovation Corps for Learning (I-Corps L)
  - EHR Core Research (ECR)

- **Cross-Directorate Programs**
  - IUSE/Professional Formation of Engineers: REvolutionizing Engineering and Computer Science Departments (IUSE:RED)
  - Faculty Early Career Development (CAREER) Programs
  - Other Programs
Improve STEM Learning & Learning Environments:
Improve the knowledge base for defining, identifying, and innovating effective undergraduate STEM education teaching and learning for all NSF-supported disciplines, and foster widespread use of evidence-based resources and pedagogies in undergraduate STEM education.

Build the Professional STEM Workforce for Tomorrow:
Improve the preparation of undergraduate students so they can succeed as productive members of the future STEM workforce, regardless of career path, and be engaged as members of a STEM-literate society.

Broaden Participation & Institutional Capacity for STEM Learning:
Increase the number and diversity of undergraduate students recruited and retained in STEM education and career pathways through improving the evidence base for successful strategies to broaden participation and implementation of the results of this research.

Proposals should describe projects that build on available evidence and theory, and that will generate evidence and build knowledge.
IUSE: EHR Program

Two Program Tracks

Engaged Student Learning

- Exploration & Design (smaller scale)
  - Up to $300K
  - Up to 3 yrs

- Development & Implementation (larger scale)
  - Level I: Up to $600K Up to 3 yrs
  - Level II: $601K to $2M Up to 5 yrs

Institutional and Community Transformation

- Exploration & Design (smaller scale)
  - Up to $300K
  - Up to 3 yrs

- Development & Implementation (larger scale)
  - Up to $3M
  - Up to 5 yrs

Focus on approaches to increase the propagation of highly effective methods of STEM teaching and learning.

Deadlines (Both tracks):
- Exploration/Design: November 2, 2016
- Development/Implementation: January 11, 2017

Focuses on design, development, implementation of and research on STEM learning models, approaches, and tools.
Advanced Technological Education (ATE) Program

ATE was launched by NSF in 1993 in response to the Scientific and Advanced-Technology Act (SATA) of 1992

- **FOCUS:** education of science and engineering technicians for high-technology fields that drive the nation’s economy
- ATE Projects, ATE Centers & Targeted Research on Technician Education

Community and technical colleges *must be* in leadership roles

Grades 7-12, two-year and four-year institutions (*pathways*)

Education / Industry partnerships are a hallmark of ATE

Deadline: October 6, 2016
ATE Program

Three Program Tracks

ATE Projects
Up to $900K, Up to 3 yrs
except
*Small/New to ATE:*
Up to $200K for 4 yrs

*Coordination Networks:*
Up to $800K for 4 yrs

ATE Centers

Targeted Research in Technician Education
From $150K, Up to 2 yrs to $800K, Up to 3 yrs

Three Types

- National
  Up to $4M
  5 yrs

- Regional
  Up to $3M
  4 yrs

- Support Centers
  Up to $1.6M
  4 yrs

Deadlines (All Proposals):
October 6, 2016
Active ATE Awards

NSF Scholarships in STEM (S-STEM) Program

Supports institutional scholarship programs for full-time, academically-talented STEM students with demonstrated financial need.

- Scholarship Amount: Up to $10,000 per student per year (depending on financial need)
- 60% of Budget to Scholarships – 40% to Student Support, Admin., Research, Evaluation
S-STEM Program

Institutional Capacity Building (Track 1)
- Up to $650K
- Up to 5 yrs

For institutions with limited experience in implementing effective curricular and co-curricular activities

Design and Development (Track 2)
- Up to $1M
- Up to 5 yrs

For multi-institutional consortia

Multi-institutional Consortia (Type 2)
- Up to $5M
- Up to 5 yrs

Seeks to leverage S-STEM funds with institutional efforts and infrastructure to increase and understand impacts

Deadlines (All Proposals):
- March 29, 2017
- Last Wednesday in March, annually thereafter
Issue: Some proposals may appear to be “totally focused” on simply giving out scholarships.

Background: A major goal of the new solicitation is that all proposals should be “knowledge generating.” Projects should be gathering information on their unique thrust. Learning about how the …

• Particular workforce needs identified,
• Instructional focus of their academic programs, and
• Support structures targeting “points of failure” identified in an institutional scan

...work together and how they are being evaluated and the “lessons learned” disseminated to the broader S-STEM community.

We want to learn how to best award scholarships to have the maximum impact!
Innovation Corps (I-Corps™)

- **Problem**: Research innovations not reaching potential users. Increase sustainable scaling of outcomes of NSF research.

- Promote **adoption of innovations** in STEM education resulting from prior NSF support

- Lean and agile philosophy: Customer discovery
Innovation Corps (I-Corps™)

• Up to $50K award combined with intensive workshops and highly engaged mentors
• Participate as a 3-person team in a 7-week program

- Principal Investigator
- Entrepreneurial Lead
- Mentor

• Application process
• Must be invited to submit proposal

https://www.nsf.gov/news/special_reports/i-corps/teams.jsp
EHR Core Research (ECR) Program

- STEM Learning
- STEM Learning Environments
- STEM Workforce Development
- Broadening Participation
EHR Core Research (ECR) Program

Addresses persistent challenges in **STEM**:

- **Interest**
- **Education**
- **Learning**
- **Participation**
- **Understand**
- **Build theory to explain**

by emphasizing accumulation of **robust evidence** to inform efforts to:

- Suggest interventions and innovations
EHR Core Research (ECR) Program

- **Funding Levels/Types**
  - Level I proposals: up to $500,000 for up to 3 years
  - Level II proposals: up to $1.5M for up to 3 years
  - Level III proposals: up to $2.5M for up to 5 years
  - Synthesis proposals: up to $300,000 for up to 2 years
  - Conferences and Workshops: generally $25,000 to $100,000

**Proposal deadline:**
September 14, 2017
IUSE/Professional Formation of Engineers: REvolutionizing Engineering and Computer Science Departments (RED)

• **Key Challenges Addressed:**
  o Bridging innovations in introductory- and capstone-level engineering and computer science education across the entire undergraduate experience, including extracurricular professional activities and student transitions in and out of the program
  o Faculty development, faculty reward systems, and academic cultures that encourage engagement of faculty and students of diverse backgrounds in the full undergraduate-level PFE process

• **Funding Level**
  o $1M to $2M for up to 5 years
IUSE/Professional Formation of Engineers: REvolutionizing Engineering and Computer Science Departments (RED)

- Team Members:
  - PI – Dept. Chair/Dean
  - Education Researcher
  - Social Science Expert

Proposal Deadline Dates: Letter of Intent: December 09, 2016; Full Proposal: January 18, 2017
Faculty Early Career Development (CAREER) Program [NSF-wide]

- Supports junior faculty early in their independent research careers who exemplify the role of teacher-scholar
- EHR CAREER research may focus on understanding STEM learning and education
- Five-year integrated research and education plan, with minimum total budget request of $400K ($500K in BIO, ENG, PLR)
- EHR programs that accept CAREER proposals include:
  - Improving Undergraduate STEM Education (IUSE)
  - EHR Core Research (ECR)

Proposal Deadline Dates: July 2017 (various)

www.nsf.gov/career
Research Experiences for Undergraduates (REU)

- Supports active research participation by undergraduate students
- **REU Sites** - based on independent proposals to initiate and conduct projects that engage a number of students in research
- **REU Supplements** may be included as a component of proposals for new or renewal NSF grants or cooperative agreements or may be requested for ongoing NSF-funded research projects

Proposal Deadline Dates: August 23, 2017
Other Programs

• INCLUDES: NSF 17-522
• CyberCorps: NSF 15-584
  – Scholarship track
  – Capacity track
Receiving NSF Notifications

• Deadlines are 90 days after the announcement is posted to the NSF website

• To get notifications, go to [www.nsf.gov](http://www.nsf.gov)
  – Click on “News” in the top menu panel
  – Click on the “Get News Updates by Email” link at the top
  – You can also sign up to get updates from Directorates
Thank you!

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